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# DMC — Distributed and Mobile Collaboration Workshop Report

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## 1. Introduction

The latest trends in distributed and mobile collaboration technologies allow people to move across team forms and organizational boundaries as well as to collaborate among/in organizations and communities. The ability to query the company's distributed knowledge base and to cooperate with co-workers is still a requirement, but new paradigms such as service-oriented computing increased pervasiveness, and mobility enable new scenarios and lead to higher complexity of systems. Independently of the business domain, private "collaboration" has become a hot issue. Virtual communities, may these be social networks or virtual enterprises, have enjoyed a tremendous popularity recently and are starting to require functionalities for collaboration in the broadest sense similar to those in business environments. The wide-spread availability of mobile devices makes support for mobility an arising topic in this domain as well.

The Distributed and Mobile Collaboration, DMC for short, workshop took place on the second day of the 16th IEEE International Workshops on Enabling Technologies: Infrastructures for Collaborative Enterprises (WETICE), that is, on June the 19<sup>th</sup> 2007 in Paris, France. The 2007 edition has been the fifth one of DMC. The workshop has registered 15 paper submissions out of which 4 papers were selected as full papers (26,7% acceptance rate). To foster discussion during the workshop and given the relevance to distributed and mobile collaboration themes, 6 additional

papers were accepted as short papers.

The paper by Shiping Chen, Surya Nepal, Jonathan Chan, David Moreland and John Zic entitled "Virtual Storage Services for Dynamic Collaborations" was selected by the program chairs as the best paper, awarded a plaque and the privilege to have a longer version invited in the International Journal of Ad Hoc and Ubiquitous Computing. During the plenary session on June 20<sup>th</sup>, John Zic had the opportunity to summarize the major contribution of the work of his team to the WETICE audience.

## 2. Workshop sessions

The papers presented at the DMC workshop can be broadly classified into three categories: architectural papers, middleware papers, and case studies papers. Such a classification has been maintained, insofar as possible, also in the three sessions held during the workshop. We review the various sessions one at the time, next.

### 2.1. Architectures for enabling collaboration

The first session included three papers relating to architectural issues regarding collaboration.

- An Architectural Approach to Apply the Supervisor/Worker Collaboration Pattern to Nomadic

Workspaces by *Manfred Bortenschlager, Gabriele Kotsis, Sigi Reich* (full paper)

- A software architecture for simple and reliable computing environments for collaborative work by *Patrizio Pelliccione, Hoa Dung Ha Duong, Christian Melchiorre, Eike Michael Meyer, Ignacio Nieto, Gerard Paris, Frederique Tastet-Cherel*
- Collaborative Software Engineering Using Model-Driven Approach by *Vitaly Semenov*

The paper “An Architectural Approach to Apply the Supervisor/Worker Collaboration Pattern to Nomadic Workspaces” proposes a three level architecture based on a peer-to-peer topology to enable collaboration. In particular, the authors define a collaboration pattern, named supervisor/worker pattern, which realizes the three level architecture. An instance of a software realization of the pattern is presented in the context of emergency management situations.

The description of the software architecture having a central role in the European project POPEYE is presented in “A software architecture for simple and reliable computing environments for collaborative work.” The architecture does not require any fixed infrastructure and builds on top of peer-to-peer ad-hoc networks. It is assumed that collaborating parties can move at walking speed. In addition, the communities of collaborators are open and dynamic during the collaboration itself.

The final paper of the session is concerned with “Collaborative Software Engineering Using a Model-Driven Approach.” The author proposes a process for reconciling at the semantic level different replicas of software collaboratively built. The phases of such a process begin with a matching one to identify differences among the replicas. The following phases provide a semantic analysis and deduction in order to plan for the reconciliation. Once it is decided on what to reconcile, the alignment is scheduled and performed.

## 2.2. Ad-Hoc networks and security

The second session of the workshop focused on the more technological aspects including elements of middleware, ad-hoc networking and security. The following three papers belong to this session.

- Context-Aware, Collaborative Applications for Inter-Networked Cars by *Wolfgang Woerndl, Robert Eigner* (full paper)
- Virtual Storage Services for Dynamic Collaborations by *Shiping Chen, Surya Nepal, Jonathan Chan, David Moreland, John Zic* (full paper)

- A middleware for mobile spontaneous short-range ad-hoc networks by *Antonio Palmeira Filho, Francisco Jos da Silva*

A look into the future of driving is provided by the paper “Context-Aware, Collaborative Applications for Inter-Networked Cars.” The authors, involved in a nationally funded project together with members of the German automotive industry, present an infrastructure based on WiFi for creating ad-hoc networks between cars and land stations, such as gas-stations or other public utilities. The proposed solution comprises a context awareness module which considers, among other things, the car location and speed, and a recommendation system to inform the driver of locations or events that might be of his interest.

Motivated by the question of what is possible to do today having broadband widely available, the authors of the paper “Virtual Storage Services for Dynamic Collaborations” propose a global distributed storage with a common interface. The emphasis of the proposed system is on collaboration and on guaranteeing a certain level of security. In fact, the domain of application is a sensitive one: that of medicine. The work is nicely completed by an experimental evaluation of the system and a comparison with alternative solutions.

The last paper of the session is “A middleware for mobile spontaneous short-range ad-hoc networks.” The authors define a framework to empower developers of collaborative software. The target is applications for managing and sharing digital content within groups of people on a spontaneous short-range ad-hoc network. This is a common scenario, for instance, for social networking, in the virtual classroom, for collaborative work among consultancy teams, and so on. The middleware provides a number of services to allow for rapid and effective application development.

## 2.3. Case studies and applications

A number of cases studies and taxonomies related to distributed and mobile collaboration were presented in the final session of the workshop. These included the following four papers.

- A View-based Analysis of Distributed and Mobile Teams by *Christoph Dorn, Daniel Schall, Robert Gombotz, Schahram Dustdar* (full paper)
- An Extensible Co-Browsing Environment with Conference Support by *Christopher Viana Lima, Roberto Willrich, Roberta Lima Gomes, Guillermo de Jess Hoyos Rivera, Jean-Pierre Courtiat*
- An ontological approach for developing domain-independent groupware by *Jess Gallardo Casero, Miguel ngel Redondo Duque*

- Mobile Information System, Health Work and Community Health Workers in Less Developed Countries by *Adesina Iluyemi, Jim Briggs, Carl Adams*

A systematization of the team characteristics and views is offered by the authors of “A View-based Analysis of Distributed and Mobile Teams.” The analysis of teams follows the lines of space, organization, project goal, human and service interaction patterns. From the analysis, the authors are also able to propose a set of team requirements which come from different dimensions such as management, interaction, information, and technology. One of the advantages of the definition of a team requirements model is the possibility to identify the different requirements in collaborative working environments of different team forms.

The synchronization of browsing activities between distributed surfers of the Web is the object of the paper “An Extensible Co-Browsing Environment with Conference Support.” Such an application needs to be enriched with an appropriate communication tool to allow users to discuss about co-browsed subjects. The authors propose to use an infrastructure to allow multimedia communication during the browsing, in particular the use of a package based private branch exchange (Asteriks IP PBX). The concrete case study analyzed and implemented by the authors is that of a conference controller.

The paper “An ontological approach for developing domain-independent groupware” presents new a technique for groupware development. The technique is based on the translation from abstract UML models into design models passing through XML based specifications. The latter can be directly interpreted by an implemented CAD tool. Though the translations between models are not yet automatically performed, it is interesting to notice the use of domain independent ontologies which make the methodology widely applicable.

A look into the actual use of collaborative technology is provided by the paper “Mobile Information System, Health Work and Community Health Workers in Less Developed Countries.” The authors analyze the human factors in using technology in the context of healthcare in Africa. A number of interesting facts regarding how design may be not appropriate for the actual intended use or on how technologies are used for purposes different from what they were originally designed for, highlights the importance of thorough consideration of the human factor in designing technology for distributed and mobile collaboration.

### 3. Discussion and outlook

The Distributed and Mobile Collaboration workshop has proved, once again, to be a forum were to discuss cutting edge technology regarding computer assisted remote collaboration. One aspect that seemed to have emerged from

the discussion is the insufficient consideration of the human factor. Feasibility study on how humans take advantage, or do not take advantage, of the available technology seem to be in great need. In fact, the paper on “Mobile Information System, Health Work and Community Health Workers in Less Developed Countries” by Adesina Iluyemi, Jim Briggs and Carl Adams has shown the difficulties of adopting technology which in principle would improve the mobile collaboration.

Another interesting aspect is that the workshop has also turned out to be a discussion forum for people involved in research projects. In fact, five papers were reporting on projects’ ongoing work: three related to the European Union sixth framework (EU FP6) and two national ones (from Australia and Germany). In particular, the three EU FP6 projects are closely related as each one develops around a complementary aspect of distributed and mobile collaboration: Workpad, Popeye, and inContext.

The WORKPAD<sup>1</sup> project aims at building and developing an innovative software infrastructure (software, models, services, etc.) for supporting collaborative work of human operators in emergency/disaster scenarios. In such scenarios, different teams, belonging to different organizations, need to collaborate with one other to reach a common goal; each team member is equipped with handheld devices (PDAs) and communication technologies, and should carry on specific tasks. The main goal of POPEYE<sup>2</sup> is to provide the concepts, methods and core services for next generation mobile collaborative working environment with emphasis on P2P information exchange model in the environment of heterogeneous mobile ad hoc networks. Finally, the INCONTEXT<sup>3</sup> project focuses on context awareness for supporting the nomadic workers. In fact, Knowledge Workers are increasingly involved in new kinds of organizational structures and work interaction patterns that require highly dynamic forms of collaboration, ranging from Nimble (short-lived) to Virtual and Mobile/Nomadic Teams.

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<sup>1</sup><http://www.workpad-project.eu>

<sup>2</sup><http://www.ist-popeye.com>

<sup>3</sup><http://www.in-context.eu>